

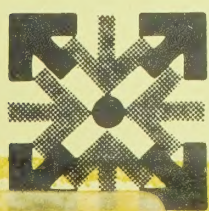
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The Regional Municipality of
Hamilton-Wentworth

Solid Waste Management Study

Summary of Final Report and Hydrogeological Aspects



Proctor & Redfern Limited

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REGIONAL MUNICIPALITY OF
HAMILTON-WENTWORTH

SOLID WASTE MANAGEMENT STUDY

SUMMARY OF FINAL REPORT

AND

SUMMARY OF HYDROGEOLOGICAL ASPECTS

Project E.O. 74181

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Drawing showing Hydrogeological Conditions in the
Regional Municipality of Hamilton-Wentworth



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1. INTRODUCTION

The purpose of this portion of this document is to summarize the material contained in the consultant's final report on the final recommendations for a solid waste management system for the Region.

2. THE RECOMMENDED SYSTEM

The Recommended Regional Waste Management System consists of the following components:

- A 250 tons per day loose transfer station located at the existing Dundas landfill site and loose transfer packer vehicles
- SWARU
- A 2000 tons per day baler - transfer station located adjacent to SWARU and bale transfer vehicles
- A 1000 tons per day baler - transfer station located at the existing Upper Ottawa Street landfill site and bale - transfer vehicles
- A 537 acres (250 acres useable) balefill site in the Township of Glanbrook

The proposed system is capable of managing all wastes with the exception of construction debris. It is recommended that this relatively inert type of waste be used to rehabilitate the many quarries in the Region, and that such rehabilitation projects be managed privately. In addition, it is recommended that this material be used for the rehabilitation of the Regional landfill sites.

The method of handling wastes from each of the collection areas is described below:

1. West Collection Area: Township of Flamborough and Town of Dundas:

All wastes are deposited at the Dundas transfer station. They are then transferred to large loose packer vehicles and transported to the East Hamilton baler station. The wastes are then baled, transferred to Glanbrook and deposited in the balefill site.

2. South Collection Area: Hamilton and Stoney Creek south of the escarpment, the Town of Ancaster and the Township of Glanbrook:

All wastes are deposited at the Upper Ottawa Street Baler Station where they are baled, transferred to bale transport vehicles, conveyed to Glanbrook and deposited in the balefill site.

3. North Collection Area: Hamilton and Stoney Creek north of the escarpment:

All wastes other than those conveyed in small private vehicles arrive at a "traffic separation point". Combustible wastes to the capacity of SWARU are directed to that facility. All other wastes are directed to the East Hamilton baler. They are then baled, transferred to bale transport vehicles, conveyed to Glanbrook and deposited in the balefill site.

Wastes conveyed in small private vehicles (station wagons, pickup vehicles, etc.) originating in this area are deposited at the Upper Ottawa Street baler and finally deposited in the Glanbrook balefill site.

The advantages and disadvantages of the recommended system and other systems that were examined are discussed in some detail in our final report. The main advantages of the recommended system may be summarized as follows:

- (i) Collection traffic split between three disposal points, resulting in tolerable traffic loads.
- (ii) Bale transfer traffic split between two baler stations.
- (iii) No area municipality faced with unusually high haul cost to disposal area.
- (iv) Reasonable estimated total handling and disposal cost for Region (\$11.00 per ton).

3. THE BALER CONCEPT

A substantial investment in refuse baling equipment is recommended. To our knowledge this will be the first refuse baler installation in Canada. There are several successful refuse baling facilities in the United States.

Balers are massive pieces of equipment that reduce quite large volumes of materials to a bale which for the recommended type would have dimensions of approximately 3' x 3' x 4'. As well as being able to handle all types of refuse including large refrigerators and washing machines, the same equipment is even capable of reducing automobiles to a similar (but heavier) bale.

Baling may be classified as a materials handling solution to the solid waste management problem. In our view it is the most logical modification to the sanitary landfill method that can be made in Hamilton-Wentworth. While the system has been designed to be compatible with and act as a backup to processing systems which reduce the mass of wastes to be landfilled, it should not be compared directly to them.

The advantages of the baler-transfer system of solid waste management may briefly be described as follows:

- 1). Compaction takes place in a factory-like controlled environment rather than on a relatively uncontrolled sanitary landfill site. The amount of compaction of the waste is therefore better controlled than for any other system.
- 2). Compacted refuse bales have the highest density of any form of compacted refuse (including on-site compacted shredded waste), thus transfer traffic from the (baler) transfer station to the disposal site is minimized, as is land use per unit of waste disposed.
- 3). The capital and operating costs of a large baler-transfer station are comparable with those of a loose transfer station. Since there are several advantages of handling baled rather than loose waste, for a large installation it is logical to select bale-transfer rather than loose transfer.
- 4). Baled refuse has the lowest rates of methane and leachate generation of any form of landfill of solid waste.
- 5). The bale installation procedure at the balefill (disposal) site is simple, aesthetic and quiet.

- 6). The system can be used as a backup to any future solid waste processing system in the Region, and can also be used to handle the residue from any such system.

The details of the proposed baling-transfer disposal process at the East Hamilton location are as follows:

The entire baling operation will take two minutes - one minute for loading, and one minute for the actual baling cycle. The recommended system has sufficient capacity for the design load if the equipment is operated on a two shift basis. The refuse stream will generally arrive at the baling facility over an eight hour period. At the end of the first baling shift, there will be a large backlog of refuse. Cost estimates include the cost of baler buildings sufficiently large to contain all of this material indoors. Following baling, the cubes will be placed on flatbed trailers and covered with tarpaulins for transportation to the balefill site. During the second shift, these loaded covered trailers will be stored overnight in the baler station yard. The bales will be covered and since they will be virtually inert they will not cause any odour problem or attract birds and rodents.

Once the bales arrive at the balefill site the landfill operation merely consists of stacking and covering the bales. No compaction

4. THE PROVINCIAL RESOURCE RECOVERY PROGRAMME, IN- NOVATIVE WASTE MANAGEMENT SYSTEMS AND THE RECOM- MENDED REGIONAL SYSTEM

In October of 1974 the Minister of the Environment introduced a new Provincial programme for the reclamation of materials from solid waste.

The objective of the programme is that the vast majority of the Province's solid waste will be processed by "front end" materials recovery plants by 1990. These plants, probably by means of shredding, magnetic separation and air classification will separate metals, glass, paper and other materials from the waste stream. These materials would then be re-used by industry. Unfortunately at this time the market for such materials is subject to sudden fluctuations which affect the economic viability of the recovery plants. In some cases the market for paper has virtually disappeared, resulting in landfilling separated refuse.

As recovery facilities become more common, we anticipate that more stable markets for the recovered materials will develop, and we envisage that such a recovery plant, in addition to SWARU, will exist in some form in the Region by 1990. It is the consultant's recommendation, however, that the Region not proceed with such a plant at this time. This course of action will have the following advantages:

1. Lower Capital Investment by the Region at this time.

2. Permits the implementation of a workable, tested recovery system at a later date (let others do the research and development work).
3. Markets for the sale of recovered materials will be developed prior to construction of the plant.

The recommended solid waste management system has been specifically designed so that a "front end" system can be added on. It is recommended that sufficient space be set aside at the East Hamilton and Upper Ottawa Street baler sites for resource recovery plants. The balers would then be used to process the residue from each of the recovery plants, and this material would continue to be balefilled at Glanbrook.

Highly Innovative Waste Management Systems

Several types of highly innovative waste management systems are reviewed in our final report. These systems have, to varying degrees, the following common characteristics:

- (i) High Capital Cost per ton of waste capacity
- (ii) Lack of proven experience
- (iii) Lack of development of markets for sale of products of the process, and hence uncertain revenues from such sales.

(iv) Production of a residue which must be landfilled.

Due to the above factors, it is the Consultant's recommendation that the Region not proceed with another highly innovative waste management system at this time.

HYDROGEOLOGICAL ASPECTS

1. INTRODUCTION

The purpose of this document is to summarize the hydrogeological reasons for locating the proposed balefill disposal site at the proposed location in the Township of Glanbrook.

2. GENERAL

A detailed hydrogeological impact study for the entire Region was carried out by Gartner Lee Associates Limited, Consulting Engineering Geologists. The assessments in the study were based on field visits, literature research, airphoto interpretations and interpretations of Ministry of the Environment water well records. No subsurface drilling was carried out. A drilling programme should be carried out at the recommended balefill disposal site before the final application for approval is made to the Ministry of the Environment. The drilling programme should confirm the conclusions that have been arrived at from the hydrogeological work to date.

The attached plan shows the relative suitability of land within the Region for landfill purposes. A review of this plan shows that the most suitable lands form a strip along the southerly boundary of the Region. Lands within a six mile radius of Mount Hope Airport were generally eliminated from consideration in order to avoid the possibility of aircraft - bird conflicts. Although landfill sites generally do attract birds, the balefill system proposed in the report should minimize or eliminate this problem. Proper operation of the balefill disposal site will probably result in any bird problem being minimized and show that balefill disposal sites can be located close to airports.

As a result of the various restraints only two areas within the Region are suitable for landfill sites - the south-west corner of Glanbrook Township and a small area in the south part of the Town of Ancaster. The recommended site was selected for transportation reasons (it is close to the Highway #56 - Highway #20 corridor) and because it will result in a disturbance to a minimum number of people.

3. THE RECOMMENDED BALEFILL DISPOSAL SITE

The proposed balefill disposal site is located in Concession IX of Glanbrook Township, to the west of Highway #56. The surface of the site is covered with glacial clay 10 to 15 feet deep. Beneath this material is a layer of dense clay which is present down to the bedrock surface. The two layers of clay are relatively impermeable and tend to seal the land from the bedrock and hence there is very little possibility of pollution being transferred from a landfill site located on top of the clay to the water bearing bedrock.

A branch of the Welland River passes through the site as does another smaller stream. The floodplains of these watercourses should not be used for landfill purposes. The non-usability of these lands has been taken into account in the calculations of the required land area for the proposed balefill disposal site.

The drilling and sampling programme referred to in Section 2 in addition to confirming the hydrogeological assessment of existing data will provide information as to whether a leachate collection system will be required at the site. Such a system can be easily designed at this site if it is found to be necessary.

Whether a leachate collection system is required or not, continual monitoring of the site should be carried out to ensure

that there is only a minimal impact on the quality of the soils-water environment as a result of the balefill operation. The information collected during the monitoring programme should be made public so that all interested persons can be reassured regarding the effects of the balefill on the environment.

4. REHABILITATION OF QUARRIES

A hydrogeological investigation of 22 quarries in the Region was carried out. All of these sites were found to be unsuitable for landfill purposes, either due to the high cost of special measures to prevent leachate problems or the complete impracticability of such methods.

The quarries are, of course, located above the escarpment which is composed of material known as the Lockport-Amabel formation. The material is an excellent water well aquifer, and any leachate entering it would receive very little purification other than by dilution. The quarries that have been worked are generally at the easiest locations, where the rock forms a high point, hence they form recharge areas, with wells down gradient from them. Their potential for transmission of leachate into the rock structure has been aggravated by blasting which has opened existing joints to an even greater extent.

As a result of our hydrogeological conclusions regarding the quarries in the Region, it is our recommendation that none of them be used for landfilling material that is likely to generate leachate.

The quarries, however, are excellent sites for the disposal of what is described in the final report as "non-acceptable wastes".

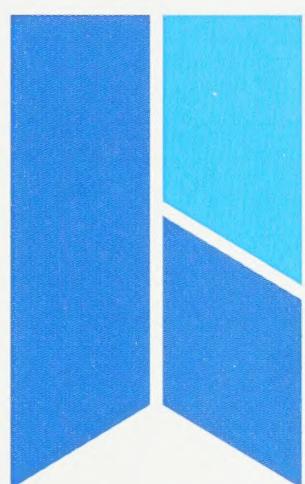
These wastes consist of construction debris, broken concrete, asphalt and similar materials. These materials in a landfill situation result in almost no leachate generation and are ideal for quarry rehabilitation projects. It is our recommendation that these wastes be disposed of in quarries within the Region. This will result in the acceleration of quarry rehabilitation within the Region and will prevent construction debris taking up valuable capacity at the Region's balefill disposal site.

5. EXISTING LANDFILL SITES

Most of the existing landfill sites in the Region are located on sites that are unsuitable for landfill purposes. For this reason, it is our recommendation that all of the existing sites be eliminated, and rehabilitated using non-acceptable wastes.

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